Effects of body posture depend on the content of thoughts: Confidence, validation and matching

Honors Research Thesis

Presented in partial fulfillment of the requirements for graduation
with honors research distinction in Psychology in the
undergraduate colleges of The Ohio State University

by

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May 2012

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Abstract

Cues from the body can be used to update mental states, a phenomenon known as embodiment. For example, posing in an expansive versus contractive posture has been shown to increase feelings of power and confidence. Nevertheless, the mechanism that underlies this effect is unclear, because different factors may influence emotions and attitudes gained from certain body postures. The body postures themselves and any thoughts someone has before or while in a body position may play a role in influencing subsequent affect and attitudes. There are two mechanisms proposed in previous research. When assuming an expansive position before given a message, participants seem to pay less attention to subsequent messages. Relevant research also illustrates that ease of processing can increase confidence and the messages participants receive or create may interact with an embodiment task to act like a cue to think less. However, self-validation occurs when participants receive a message and then assume certain body positions. According to self-validation, one will feel positive when having positive thoughts about the self in an expansive position, because expansive positions create confidence in thoughts that are currently in the mind. One may feel less positive if thinking negative thoughts about the self while in this expansive position. To investigate this timing difference, 128 participants were asked to write either about a task they have excelled at or failed at, and were also asked to stand and sit in either expansive or contractive positions. Their current affect and self-attitudes were measured. The results indicated that when put into body positions first, a cognitive dissonance "matching" effect occurred after the writing task was introduced. Those participants whose posture "matched" the subsequent writing task thought less than those whose posture and writing did not match in valence. Those who performed the thought direction induction writing task before the position induction task exhibited self-validation effects in the attitudes measures. This

project has implications for embodiment research and task salience; the manipulation of posture timing in relation to a thought direction induction writing task about the self is a unique contribution to the field.

Effects of Body Posture Depend on the Content of Thoughts: Confidence, Validation and Matching

The body gives cues to mental states and can impact thinking. This area of research has been of interest to psychologists for over a century. Early psychologists conjectured that body position, facial expression and movement influence what the mind thinks and believes (James, 1884; Darwin, 1872). For instance, James (1884) and Darwin (1872) argued that smiling can cause someone to feel happy and tears can cause someone to feel sad. Recently, scientists have determined that the mind frequently uses basic associative principles to interpret what the body is doing (Briñol & Petty, 2008). Many researchers have used overt behavior such as head movement or arm flexion to study this phenomenon (Förster & Strack, 1996; Briñol & Petty, 2003; Bem, 1965). For example, studies show that nodding one's head led to a preference of a neutral object (for example, a blue or burgundy pen), whereas shaking one's head led to an aversion toward a neutral object (Tom et al., 1991). When this type of experiment was done with arm flexion versus extension, stimuli presented during arm flexion were typically rated more positively than stimuli presented during arm extension (Cacioppo, Priester & Berntson, 1993). Nodding and arm flexion create feelings of positivity, while head shaking and arm extension create feelings of negativity. Studies also show this effect in conjunction with persuasive messages (Wells & Petty, 1980). Participants who employed vertical head movement (nodding) while listening to a radio broadcast were more likely to agree with the radio broadcast than those employing horizontal head (shaking the head) movement (Wells & Petty, 1980). Therefore, the the mind associates body movement with degree of preference for an object or argument presented to someone. These are just a few example of what researchers label as embodiment, a phenomenon in which body posture and body movement influence thought content. The present

study investigated the associative process between body posture and its influence on perception, in order to examine the mechanisms underlying specific details of the body positioning process.

Embodiment can influence thought content in multiple respects. One line of research suggests that body posture can increase or decrease feelings of power by directly affecting emotions (Carney, Cuddy & Yap, 2010). Carney et al. postulated that when put into expansive standing and sitting positions, participants would feel significantly more powerful. To test this hypothesis, they measured participants' testosterone and cortisol levels and performance on a risk-gambling task. In expansive positioning (see Figure 1 in Method section), participants stand or sit openly, with good posture. While standing, participants lean onto a table, with hands resting on the surface. While sitting, participants rest their legs on a table and lean their heads back into their hands. In contractive positioning (see Figure 2 in Method section), participants stand or sit in closed-off positions with bad posture. While standing, participants keep their legs close together and ankles crossed, while wrapping their arms around their body. While sitting, participants keep their legs close together and their hands in their lap. Their backs are slightly hunched. Carney, et al.'s (2010) results indicated that there was a difference in hormone levels between participants in the differing body postures. Those in the expansive positions were more likely to engage in gambling behavior and had higher testosterone levels, as well as lesser amounts of cortisol. Embodiment can affect feelings of power by acting as a direct cue to emotional affect, as in the above study, but other models argue that this may be only one part of the underlying mechanism.

Another embodiment model focuses on how certain body positions lead to different confidence levels: expansive postures lead to higher confidence levels and contractive postures lead to lower confidence levels (Keltner & Haidt, 2003). In general, feelings of power are also

connected to higher confidence levels than feelings of powerlessness (Briñol, Petty, Valle, Rucker & Becerra., 2007). Briñol et al. found that those in a high power condition of a role-play scenario reported higher confidence and higher feelings of power than those in the low power condition (Briñol et al., 2007). Thus far, research has established that body posture can lead to contrasting feelings of agreement, contrasting feelings of power and also contrasting feelings of confidence. One model (Carney et al., 2010) found evidence to support a direct link between embodiment processes and affect, while another model (Briñol et al., 2007) proposes an indirect link between embodiment processes and affect through feelings of confidence, which can affect feelings of power through differing levels of confidence.

Since body posture may play multiple roles in influencing thoughts, the context of current embodiment research is important to consider. Recent research on embodiment has focused on the effect of body cues on the influence of persuasive messages. Embodiment can influence affect and attitudes through multiple processes in relation to messages people may hear while in different body positions. Expansive postures elicit higher feelings of confidence than do contractive positions, according to the model that investigates posture and persuasive messages. These persuasive messages may also be generally considered to be "established thoughts." When a message is received (or thoughts are established) after a body position induction, confidence is influenced, and there are a variety of situations or processes by which confidence can work (Horcajo, Petty & Briñol, 2010). Firstly, when a person is confident in his or her own personal opinion, the confidence acts as a cue to think or process less once thoughts have been established about the topic of interest. Additionally, when someone is confident in a different source's message, the confidence can also act as a cue to think less about other incoming information (Horcajo et al., 2010). Confidence is also interconnected with salience in that confidence

inductions typically increase confidence in whatever is salient in someone's mind. Any prior strong opinion or argument would be salient and confidence inductions would increase reliance on those prior opinions or arguments. If someone has no accessible prior opinion, then that someone typically relies on any arguments in a source's message (Horcajo et. al., 2010). Once inducted, the confidence at the core of Briñol and Petty's model is important to consider along with salience and amount of subsequent processing.

According to work done by Briñol and Petty, when confidence or doubt is induced prior to a persuasive message through a body position induction, those that are made to feel confident then feel assured in their prior positions or opinions and are less likely to process subsequent messages than those made to feel uncertain (Horcajo et al., 2010; Briñol, Petty, Gallardo & DeMarree, 2007). In an experiment which utilized standing and reclining postures, participants listened to messages that either contained strong or weak arguments in favor of a particular point (Petty et al., 1983). Participants that were reclining were only persuaded by the strong messages and were less persuaded by the weak messages. Participants that stood were equally persuaded by both the strong and weak messages. From this, Petty et al. (1983) inferred that those participants who were reclining paid more attention to the arguments of each message due to their current body positioning, since everything else in the study remained constant between the two conditions. Petty et al. called the reclining-condition "message-relevant thinking." Participants that were standing were more susceptible to the influence of both the strong and weak arguments because they were not paying as close attention to the task as a result their body positioning. Not actively thinking about the arguments likely led the participants to find all of the arguments equally likely and familiar, leading to belief in both the strong and weak arguments equally (Briñol, Tormala & Petty, 2011).

Confidence may also play a role in manipulating subsequent amount of thought through ease of processing effects (Briñol et al., 2011). Experiment tasks that relate to processing a persuasive message generally require some amount of thought and the amount of thought required is frequently controlled for by the experimenter. However, when amount of thought is not controlled, the ease by which the experiment task is processed and completed greatly affects the amount of processing each participant engages in after the task is over. Simplicity leads to less subsequent processing activity (Briñol et al., 2011). If information is difficult to process or is disfluent (which essentially entails situations in which different emotions, behaviors or cognitions are non-matching and therefore, more difficult to process), more thinking and processing is required in order to make sense of the situation and come up with the correct judgment or answer (Alter, Oppenheimer, Eyre & Epley, 2007). Difficulty, in fact, may activate an entirely different system of processing, called System 2. Difficulty or disfluency is not necessarily a direct cue, but rather a metacognitive cue for people to think more elaborately in the situations in which they experience cognitive disfluency (Alter et. al., 2007). Indeed, fluency, which leads to low subsequent processing, may also lead to making mistakes on relatively simple and undistorted questions (Song & Schwarz, 2008). Fluency may be another process which interacts with confidence to then act as an opportunity to engage in less thought.

According to work done by Briñol and Petty, when confidence or doubt is induced after a persuasive message or an established thought, self-validation is likely to occur. Using the self-validation hypothesis (Petty et. al., 2002; Briñol & Petty, 2003; Briñol, Petty & Barden, 2007), Petty et al. (2002) suggested that in order to actually judge a thought, a person must also have some level of confidence or doubt in the thought itself. This confidence or doubt in thoughts is labeled as metacognition, or essentially thoughts about thoughts (Petty & Briñol, 2008; Petty et

al., 2007). Embodiment, the phenomenon in which posture affects thoughts, is one of the well-researched topics in this area that may have a strong effect on thought-confidence relevant to the self-validation hypothesis (Briñol & Petty, 2008). When self-validation occurs, a confidence induction arrives after a message or established thoughts. People already have processed and thought about a source message or have established thoughts about some particular topic, and therefore, the amount of subsequent processing is unaffected in these situations. This confidence then applies to the salient content: the source message and whatever thoughts have been produced about this source message (Horcajo et. al., 2010). According to the self-validation hypothesis, participants that are induced to feel confident after given a persuasive message begin to think that their particular thoughts about that topic are valid. If participants are induced to feel uncertain following a persuasive message, they will think their thoughts about this message are invalid due to the amount of confidence they currently have concerning their thoughts. Confidence in thoughts influences reported attitudes, most frequently attitudes about what participants are made to be thinking at the time, in self-validation research. Even if people produce the same number of thoughts and the same types of thoughts (i.e. positive or negative), attitudes differ if the amount of confidence in those thoughts differs, which is the main tenet of the self-validation hypothesis (Horcajo et al., 2010).

One study, uniting embodiment and self-validation, used body positions to test if positioning could elicit high or low confidence in thoughts (Briñol, Petty & Wagner, 2009). The positions included placing participants in “confident” or “doubtful” postures, which are similar to the expansive and contractive positions used by Carney, et al., (2010). The researchers examined how these postures might affect self-evaluation, and found that the attitudes of the participants aligned with thoughts that participants recorded in writing during the study in the

confident position. Those in the doubtful position reported attitudes that were not aligned with what they wrote beforehand, implicating that they found their thoughts in writing to be invalid (Briñol, et al., 2009). The confidence that resulted from the confident posture embodiment feedback amplified whatever thoughts were currently in the mind, regardless of whether these thoughts were negative or positive, and thus, impacted the self-report of attitudes (Briñol & Petty, 2008; Petty & Barden, 2007; Briñol, et al., 2009).

According to the self-validation hypothesis, when participants are induced to feel uncertain after given a message, they begin to think their thoughts about that message are invalid and this has been illustrated as a double negative in research (Briñol, Petty & Wagner, 2011). One experiment studied the amount of doubt elicited by head shaking and found that it strongly influenced impression formation. Head shaking, which primed doubtfulness, counteracted an initial doubt manipulation for those in a doubt condition, and participants in the doubt/head shaking condition thereafter felt more certain due to what the researchers called a double negative between the doubtful position manipulation and the doubtful thought manipulation (Wichman et al., 2009). Varying cues from the body can induce levels of confidence or doubt (Briñol, Petty & Wagner, 2011), and many different types of confidence inductions may elicit a change of confidence in thoughts.

Although a well-researched topic, some gaps in the literature remain in regards to embodiment, power, confidence and subsequent impression formation. Although Carney et al., (2010) found an effect of body posture on feelings of power, their study lacked account of how the postures might affect confidence. The self-validation hypothesis and research on ease of processing report that body postures and fluency influence levels of confidence through metacognition, or an evaluation of current thoughts (Petty & Briñol, 2008; Petty et al., 2007;

Alter et al., 2007). During self-validation, someone with a high confidence level will be more likely to further validate whatever he or she is currently thinking. Someone with a low confidence level will be more likely to invalidate his or her current thoughts, which can produce a double negative in thought structure. Research on ease of processing effects maintains that confidence may influence subsequent thought processes when embodiment tasks are performed before participants establish thoughts (Briñol et al., 2011; Alter et al., 2007). Past research has found that effects of ease influence recall ability, and memory, which led researchers to the conclusion that participants are processing less in these situations (Briñol et al., 2011; Song & Schwarz, 2008). Amount of subsequent thinking and attitudinal judgments are then due to this level of confidence in thoughts, according to the overall model. Therefore, based on this research, Carney, et al.'s (2010) expansive and contractive positioning may first be affecting confidence levels, which then in turn influences feelings of power and other measures of affective reaction. This will be determined if the body position inductions are placed both before and after establishing thoughts. If body positions indeed interact with mental content, then there should be different effects when an embodiment task is performed before established thoughts and after established thoughts, according to Briñol and Petty's work.

Secondly, very little research has been devoted to examining different categories of thoughts that participants might be thinking about. Researchers have used topics that may be relevant to participants' personal lives, like a message about a university comprehensive exam or potential future changes in the structure of a relevant university (Petty et al., 1983; Horcajo et al., 2010). Message topics have also been more irrelevant to participants' personal lives and instead about topics like the organization of international companies or a new cell phone campaign (Horcajo et al., 2010; Briñol et al., 2007). All of these studies elicited important embodiment

data that contributed to the literature in the field. However, none of the messages used in these studies were about the participants themselves nor did these messages entail attitudinal judgments related to positive or negative aspects about the self. No study to date has manipulated induction timing along with thoughts that are produced by the participants about themselves. This study generalizes the extensive work the field has done on persuasive messages to general thoughts about the self and self-attitudes, called "established thoughts" in this thesis.

The present study had two objectives, which relate to the gaps in previous research. The first objective was to obtain a similar confidence self-validation effect in combination with Carney, Cuddy and Yap's expansive and contractive positions (2010), as well as an effect on processing after manipulating when an embodiment task is performed in relation to established thoughts. The positions developed by Carney et al. may not only elicit differing levels of power, but also contrasting levels of confidence in thoughts through metacognition. The present study examined if a confidence effect exists through a posture task and a writing task, followed by self-assessments. The second objective was to examine if using self-related thoughts that participants themselves produced, in a thought-listing procedure about their past successes and failures, may elicit the same effects that self-validation research and ease of processing research have found in the past. Both objectives contribute to a better understanding of the specifics concerning the embodiment process.

The present study manipulated the concept of timing in relation to body posture and thought direction inductions. In the current study, half of the participants assumed a body posture induction first and the other half of the participants first completed a thought listing procedure about a task or activity at which they succeeded or failed in the past. Afterwards, participants completed a survey which reported general affect and attitudes about the self.

Method

Participants

128 participants, 68 of them female, took part in the study. The mean age for all participants was 19.58 years old (SD=3.574). 106 participants identified themselves as White or Caucasian, 11 participants identified themselves as Asian, 5 participants identified themselves as Hispanic, 5 participants identified themselves as African-American and 1 participant identified himself or herself as "other." The participants were recruited from the Research Experience Program (REP) pool of students at The Ohio State University. Participants received partial credit in their introductory psychology courses for participation in research experiments run by REP. After reading a short description on the REP website, these students were able to select and sign up for experiments that they wished to participate in. Before the study began, the participants completed a consent form. The consent form informed them that the study's purpose was to learn more about how different personality characteristics were related to different tasks, which was a vague generalization of the real study purpose concerning posture effects on affect, metacognition and attitudes. See Appendix A for the full consent form. All participants gave informed consent to participate in the study.

Materials and Procedure

Participants were run in groups, varying between 1-5 people per session. Large, opaque screens boxed in each different computer station, which made running participants in larger groups essentially like running participants in individual and relatively private cells. During the tasks, participants were told to face their monitors and not look at other people for a reference.

Participants went through three stages to complete the study and were assigned to one of 8 possible conditions. One independent variable was the type of body posture, either expansive or contractive. One independent variable was the valence of the thought direction essay task, either past success or failure. The last independent variable was the timing of the first two independent variables; some participants assumed the body postures first and some participants began with a thought-listing task, which was the thought direction induction, first.

After the participants completed the survey, they were given the debriefing for the study and the optional student report form for the REP office purposes.

Order

Participants were chosen at random to take part in either the body posture induction first or the thought direction induction first. Half of participants began the study by positioning themselves in different positions that were verbally described by the experimenter before the thought direction induction essay task. The other half of participants were instructed to first list specific and individual thoughts about a task they had either excelled at or failed at in the past and then positioned themselves in the body positions. The timing of the inductions differed in order to examine any effects this differentiation may have on participants' thoughts, affect and attitudes.

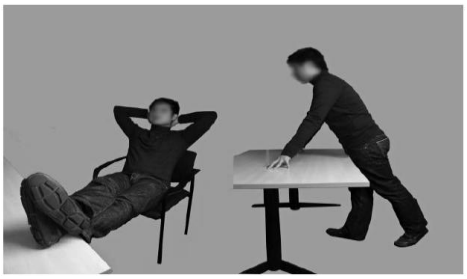
Body Posture Induction

During every session, the experimenter asked each participant to position themselves according to the Carney et. al.'s (2010) positions. Once participants were randomly assigned to take on either the expansive standing and sitting positions or the contractive standing and sitting

positions, the experimenter told them orally how to get into these positions. The experimenter first informed participants that the first portion of the experiment would consist of getting them to their baseline physiological states. After this, they would change positions a couple of times. The experimenter asked the participants to stand neutrally, or in a natural position, for one minute in order to get to the baseline state. The experimenter stood near to the participants and timed them. After timing for one minute, the experimenter verbally explained either the expansive positions or the contractive positions from Carney, Cuddy and Yap's (2010) research and instructed the participants to follow the verbal instructions. First, the experimenter timed the participants standing in either the expansive position or contractive position, depending on the relevant condition, for one minute. Then the experimenter timed the participants sitting in the expansive position or the contractive position, depending on the relevant condition, for one minute.

The experimenter instructed participants who were assigned to expansive positioning with the following words: "Please lean into the desk in front of you, with your hands resting on the table spread apart. Please widen your legs and put one leg in front of the other under the table. Keep your head up. I will time you for one minute." After a minute, the experimenter said, "Please sit down. Now put your legs up onto the desk in front of you and cross them. Lean your upper body back. Put your hands behind your head with your elbows jutting outward, and rest your head into your hands. I will time you for one minute." The experimenter instructed participants who were assigned to contractive positioning with the following words: "Please bring your legs close together and cross your ankles. Now wrap your arms around the middle of your upper body. I will time you for one minute." After the minute concluded, the experimenter finished with, "Please sit down. Bring your legs close together and place your hands in your lap.

Bring your back and shoulders forward slightly and look down. I will time you for one minute." Participants positioned themselves in either expansive or contractive positions in order to partially manipulate confidence levels. Depictions of these postures are illustrated in Figures 1 and 2, below.



Figures 1 and 2- The seated and standing expansive positions as defined by Carney, Cuddy and Yap (2010) (left) and the seated and standing contractive positions as defined by Carney, Cuddy and Yap (2010) (right).

Thought Direction Induction

At some point during the study, all participants completed a thought direction induction task. Participants were introduced to this on the experiment editor called MediaLab. The program asked participants to ignore spelling and grammar and list specific and separate thoughts about either a task at which they excelled or a task at which they did not excel. This was also decided by random assignment. The participants were allotted as much time as they needed to list individual thoughts about that task, describing how they excelled or failed, and they also took that time to record their general feelings about that successful or failed task. Participants pressed the "enter" key after writing one thought in a text box and another blank box appeared for them to write another individual thought inside. Each thought was split up from the others in order to see how much time and effort each participant put into the thought-listing task. Participants wrote about a task they either excelled at or did not excel at in order to be thinking positive or negative thoughts about themselves, centered on a specific topic.

Adjective Ratings

Following the independent variable inductions, participants completed a series of dependent measures. Participants rated on a scale of 1 to 7 the extent a series of adjectives described them (1 meaning that the adjective did not describe them at all and 7 meaning that the adjective described them very much). Of note was the variable of "having mixed feelings (i.e. feeling both positive and negative at the same time)", as well as "lost in thought", in order to gain insight about the degree to which participants were actively thinking during the study. These ratings also included "incompetent" and "assertive", as well as "powerful", "compassionate", "happy", and "enthusiastic."

PANAS

Participants then completed the Positive and Negative Affect Schedule (PANAS) (Watson et. al., 1988). This schedule listed 20 adjectives. For each adjective, participants were asked to assign a number (1 meaning "very slightly" to 5 meaning "extremely well") to how accurately a particular adjective described their current feelings and emotions. Participants indicated their feelings and current affect to give a clue to how positive or negative they were feeling at the time of the ratings.

Attitude Measures

After the PANAS, participants answered questions that measured their attitudes about themselves. They answered, for instance, questions about if they found themselves "favorable" or "unfavorable" (or somewhere in between), or "good" or "bad" (or somewhere in between). This section also asked participants if they found themselves to be "positive" or "negative" (or

somewhere in between), “wise” or “foolish” (or somewhere in between), and if they were “in favor” or “against” themselves, generally “agreed” with themselves and if they found themselves “beneficial” or “harmful” (or somewhere in between). Since the thought direction task forced participants to think about themselves in a positive or negative light, by giving a specific situation to recall, this set of attitudinal questions set up an opportunity to gain valuable information about self-attitudes following the documentation of a success or failure in conjunction with an embodiment task.

Participants also indicated how important (1 meaning “very unimportant” to 9 meaning “very important”) the task that they wrote about was to them personally, how good or bad (1 meaning “very bad” to 9 meaning “very good”) it was that they excelled or did not excel (depending on their condition) at the task they wrote about and how confident (1 meaning “not at all confident” to 9 meaning “very confident”) they were in their assessment of their ability to perform the task they wrote about, as well as how certain they were of their emotional state as documented by the PANAS and other affective measures (1 meaning “not at all certain” to 9 meaning “very certain”). Participants also indicated how certain they felt during the thought-listing portion (1 meaning “not at all certain” to 9 meaning “certain”), how valid they believed their thoughts were (1 meaning “not at all valid” to 9 meaning “extremely valid”), how persuasive or convincing their thoughts were (1 meaning “not at all persuasive” to 9 meaning “extremely persuasive”), how unique their thoughts were (1 meaning “not at all unique” to 9 meaning “extremely unique”), and if they liked the thoughts they listed in the thought-listing procedure (1 meaning “not at all” to 9 meaning “extremely”). These questions were used to gain valuable information about how the participants viewed the task they wrote about and their assessment of their own ability, as well as the metacognitive assessment of their own thoughts.

Speeded Attitude Measures

Participants read a set of instructions asking them to answer the following set of questions as quickly as possible and not to think too much about any one question. This was a speeded measure of attitudes. By asking participants to answer quickly without thinking deeply and also recording reaction times on the MediaLab program from each participant, it was possible to measure less explicit self-attitudes of the participants. A short series of questions followed the instructions and the questions were similar to the explicit self-attitude questions, asking participants how "positive" to "negative" or "favorable" to "unfavorable" they found themselves to be. The series of questions could be considered to be direct, non-deliberative measures.

Thought Ratings

Participants coded the valence of their own thoughts from earlier in the study by rating each individual thought. Participants saw word-for-word each thought they wrote from the thought listing task, one at a time, and indicated if the thought was favorable, unfavorable or neutral. If the thought was unfavorable, participants clicked a negative number on the computer screen, between -1 and -4. If the thought was favorable, participants clicked a positive number on the computer screen, between 1 and 4. If the thought was neutral, participants clicked 0 on the computer screen. This information was important to firstly examine how participants meant each of their thoughts but also to examine how seriously each participant took the task. Reaction times for this section of the study were recorded as well.

Manipulation Checks

Lastly, a couple of manipulation check questions were part of the survey before the demographic questions. Participants indicated how difficult it was to assume the expansive or contractive positioning, and also indicated if they found the postures to be a positive sign and/or confidence-inducing (1 meaning "not at all" to 9 meaning "very much" for all three manipulation checks).

Data Scoring

In order to perform statistical tests on the PANAS measures, the total PANAS score for each participant needed to be calculated. This involved summing all of the "Positive Affect" (PA) measures: "interested," "excited," "alert," "inspired," "strong," "determined," "attentive," "active," "enthusiastic" and "proud," and then summing all of the "Negative Affect" (NA) measures: "distressed," "upset," "guilty," "scared," "hostile," "irritable," "ashamed," "nervous," "jittery," and "afraid" (Watson et al., 1988). Each item of the PANAS is on a scale starting from 1 (meaning very slightly) to 5 (meaning extremely well) referring to how well each adjective described the participant.

Results

This was a 2 x 2 x 2 design. One independent variable was the positions, either expansive or contractive. One independent variable was the valence of the thought direction writing task, either positive (describing success) or negative (describing failure). One independent variable was the order of events, either the body posture induction before the thought direction induction writing task or the body posture induction after the thought direction induction writing task. The

cut-off for significance in this thesis study is $p \leq .15$, since a p-value of .15 indicates, at the very least, a trend that is approaching significance in an undergraduate thesis study.

Descriptives

To ensure that extreme scores did not bias results, the distributions for all dependent measures were examined. Outliers were defined as participant responses that exceeded a number more than 3 standard deviations from the mean. No outliers in these data were identified.

PANAS Descriptives

The mean score for overall PA was 34.91 (SD= 7.119). The mean score for overall NA was 19.1 (SD= 6.555). The descriptive statistics for the PANAS calculations are shown in Table 7 in Appendix B.

Manipulation Checks

Before examining different variables of interest, a few manipulation checks were examined to ensure that the manipulations worked as expected. One of the manipulation checks asked how difficult (1 meaning not at all to 9 meaning very much) the body postures were to recreate (M=2.3, SD=1.910). Another manipulation check asked how positive (1 meaning not at all to 9 meaning very much) participants thought the positions were (M=4.66, SD=1.879), as well as how confidence-inducing (1 meaning not at all to 9 meaning very much) participants thought the positions were (M=5.51, SD=2.407). These means are all depicted in Table 1 in Appendix B.

If the manipulation checks worked, participants should not have realized that the expansive position itself may have elicited more positive emotions or feelings of confidence. There were no significant differences in evaluations of the expansive or contractive positions being more positive or more confidence-inducing for participants in any condition. Therefore, participants did not realize that one particular position may have been more positive or more confidence-inducing than the other one ($F(1, 120)=.005$, $p=.945$)/($F(1, 120)=1.493$, $p=.224$). Tables 2, 4 and 5 in Appendix B show the univariate analysis of variance for all three manipulation checks.

Some participants, however, did find the expansive positions more difficult to get into than contractive positions. Table 2 depicts the interaction between induction order and the body position induction. The participants who experienced the thought direction induction before the body posture induction thought the positions were more difficult to get into than the participants who experienced the body posture induction before the thought direction induction ($F(1, 120)= 3.493$, $p=.064$). This is illustrated in Figure 3.

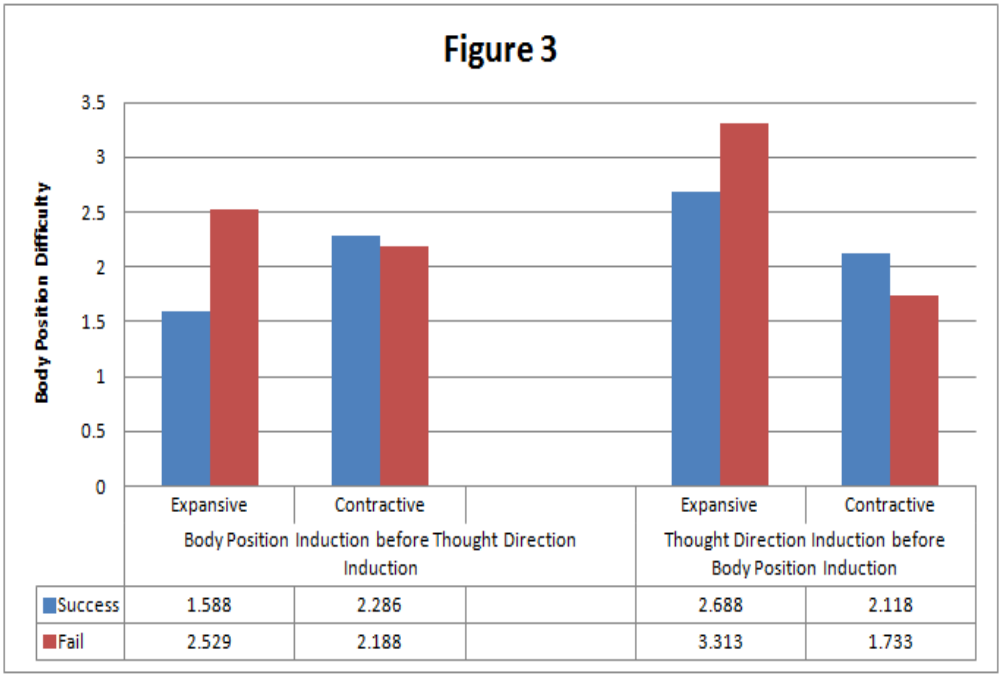


Figure 3- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Posture Difficulty manipulation check.

Performing the two fixed factor analysis of variance on the posture difficulty manipulation check, for those in the thought direction induction before body posture induction conditions, yielded a significant main effect. Table 3 in Appendix B shows the univariate analysis of variance of this. Participants who were positioned in the expansive postures when the thought direction induction came before the body posture induction felt the task was significantly more difficult than participants who were positioned in the contractive positioning in these conditions ($F(1, 60)= 1.143$, $p<.05$). This effect can also be seen in Figure 3.

There was a significant difference in the interaction between the thought induction writing task and the task order for the position positivity manipulation check in the three fixed factor univariate analysis of variance ($F(1, 120)= 3.500$, $p=.064$); however, since this interaction is not associated with the different body postures, it is still safe to assume that participants were not aware that one posture may make them feel more positive than another posture.

Factor Analysis

Although there were 10 variables in the adjective-rating task, it is unlikely that the adjectives were ten distinct psychological variables. To reduce the data into psychologically meaningful concepts, a factor analysis was performed to sort the data into meaningful categories. This factor analysis reduced the ten adjectives to three separate factors. All the adjectives that were grouped together had eigenvalues greater than 1.00. Factor 1 was labeled as these adjectives: “enthusiastic,” “compassionate,” “happy,” and “powerful.” Factor 2 was labeled as these adjectives: “sad,” “irritated,” and “incompetent.” Factor 3 was labeled as these adjectives: “lost in thought” and “having mixed feelings (i.e. both positive/negative or happy/sad).” After reducing the ten adjectives to these three factors, these factors were used in all the statistical tests

concerning the adjective ratings responses (detailed in the "Materials and Procedure" part of the "Method" section) from that point forward. See Tables 6.1 and 6.2 in Appendix B for the factor analysis.

Task Salience

One of the main study purposes was to differentiate two situations in which body posture may influence thoughts: when a body posture task came before establishing thoughts and when a body posture task came after establishing thoughts. In the case of this study, the "established thoughts" were created during a writing task in which participants detailed a success or failure, named a "thought direction induction task". If there are separate and distinct influences when thoughts are established before and after an embodiment induction, there should be a clear distinction between the two orders in this study, which supports the embodiment model of Briñol and Petty. One possible way to differentiate the two orders would be task salience. For example, if participants were in the thought direction induction task condition first and then were instructed to assume body postures, the body posture induction is more salient in their minds. Participants' thoughts about the body induction task may then be more influential in subsequent dependent measures. This has to do with what thoughts or memories are most accessible at the time (Higgins, 1996). Two separate dependent measures illustrated this differentiation of the induction timing: Factor 1, from the factor analysis of the adjective ratings, and the PANAS.

Factor 1 was labeled as these adjectives: "enthusiastic," "compassionate," "happy," and "powerful," which are inherently positive words. Those in the body position induction before the thought direction induction conditions scored significantly higher on Factor 1 than those in the thought direction induction before body position induction conditions ($F(1, 120)= 9.289$, $p<.05$).

This is to be expected if participants were influenced by task salience, or, rather, whichever task fell closest to the affective measures. There is a hint that the body position induction task was uncomfortable, as well, due to the lower scores on Factor 1 for the thought direction induction before body posture induction conditions. This is in addition to the earlier finding from the manipulation checks, that the participants who experienced the thought direction induction before the body posture induction thought the positions were more difficult to get into than the participants who experienced the body posture induction before the thought direction induction ($F(1, 120)= 3.493$, $p=.064$). The univariate analysis of variance, or ANOVA, for Factor 1 is found in Table 8 in Appendix B. Figure 4 illustrates this result in graph form.

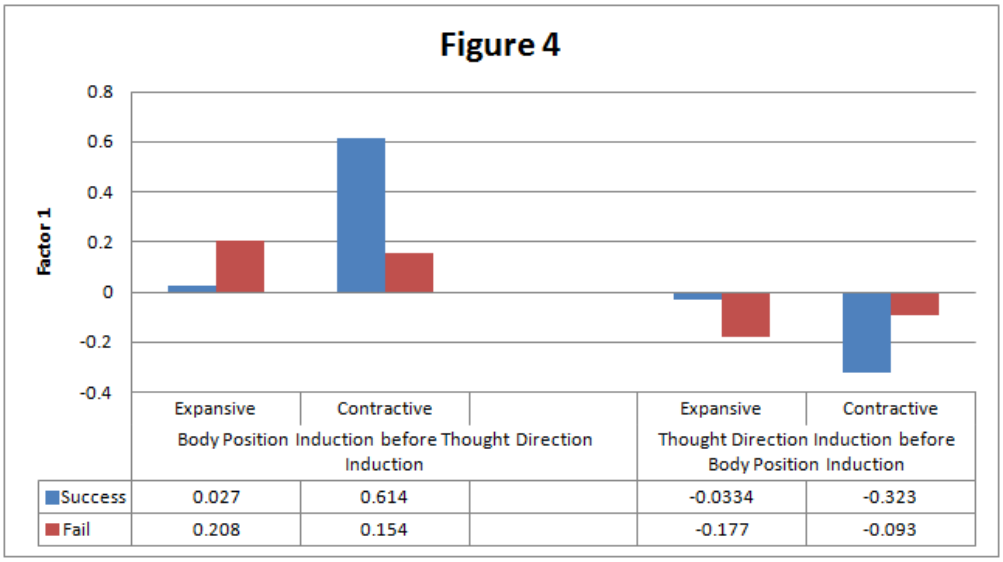


Figure 4- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Factor 1.

If task salience were an influential portion of this study, it is to be expected that there may be differences on subsequent affective measures. The results from an ANOVA on the PANAS support the differentiation between the induction timing. For the overall Positive Affect (PA), the differences between the induction timing was significant ($F(1, 120)= 5.216$, $p<.05$), and there was also a significant 3-way interaction (Posture Induction x Thought Direction

Induction x Induction Order) between the variables ($F(1, 120)= 6.196$, $p<.05$). The univariate analysis of variance for this is found in Table 9 in Appendix B.

According to these results, for the conditions in which the body posture induction was before thought direction induction task, those that were in expansive postures and wrote about excelling had medium-to-low PA, those that were in expansive postures and wrote about failing had medium-to-high PA, those that were in contractive postures and wrote about excelling had high PA and those that were in contractive postures and wrote about failing had low PA. In the conditions in which the thought direction induction writing task came before the body posture induction, those that were in expansive postures and also wrote about excelling had high PA, those that were in expansive postures and also wrote about failing had low PA, those that were in contractive postures and wrote about excelling had low PA and those that were in contractive postures and wrote about failing had high PA. Figure 5 illustrates this in graph form.

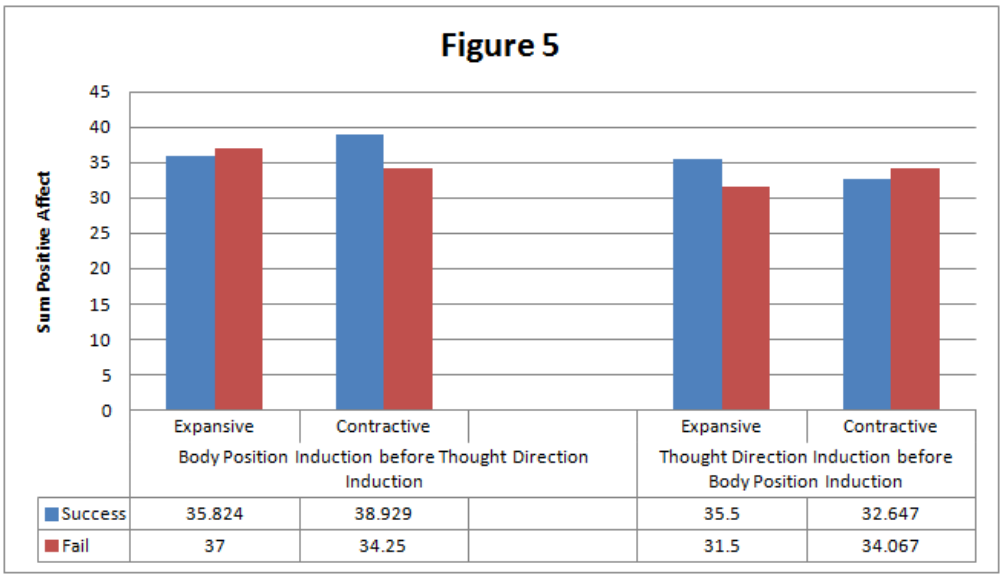


Figure 5- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Sum PA.

For overall Negative Affect (NA), there was a marginally significant main effect ($F(1, 120)= 2.648$, $p=.106$) for the body posture. The univariate analysis of variance (ANOVA) for this is shown in Table 10 in Appendix B. This is illustrated in graph form in Figure 6.

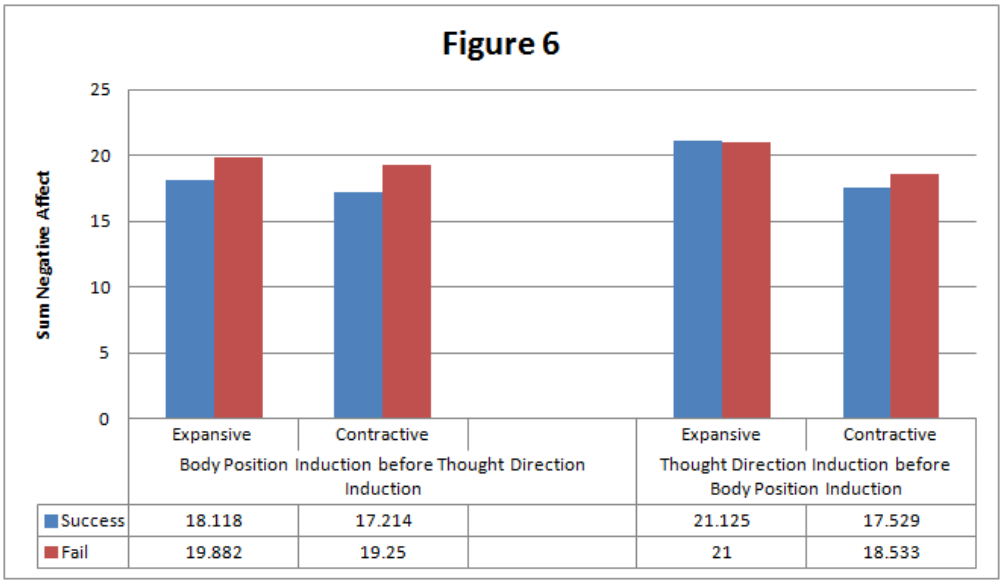


Figure 6- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Sum NA.

According to these results, those in expansive positions scored higher on NA than those in contractive positions overall, especially when the thought direction induction task came before the body posture induction task. In the body posture induction before thought direction induction task conditions, those that were in expansive postures and also wrote about excelling had lower NA, those that were in expansive postures and also wrote about failing had higher NA, those that were in contractive postures and wrote about excelling had lower NA and those that were in contractive postures and wrote about failing had higher NA. In the thought direction induction task before body posture induction conditions, those that were in expansive postures and also wrote about excelling had higher NA, those that were in expansive postures and also wrote about failing had higher NA, those that were in contractive postures and wrote about excelling had lower NA and those that were in contractive postures and wrote about failing had lower NA.

If task salience were one variable that influenced differences between the task orders, there should be a difference in the overall affective measures when combined. Using the results of the PANAS administered in this study, the separate dimensions of Positive Affect and Negative Affect can be combined in order to be placed on a two-factor structure of affect

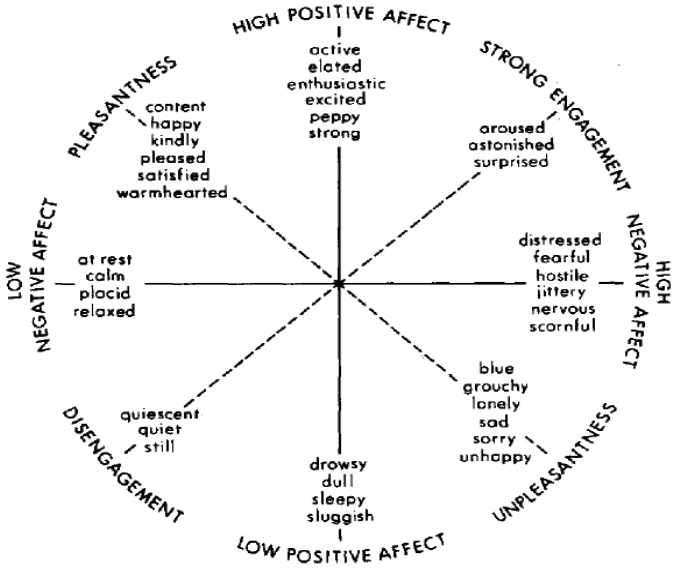
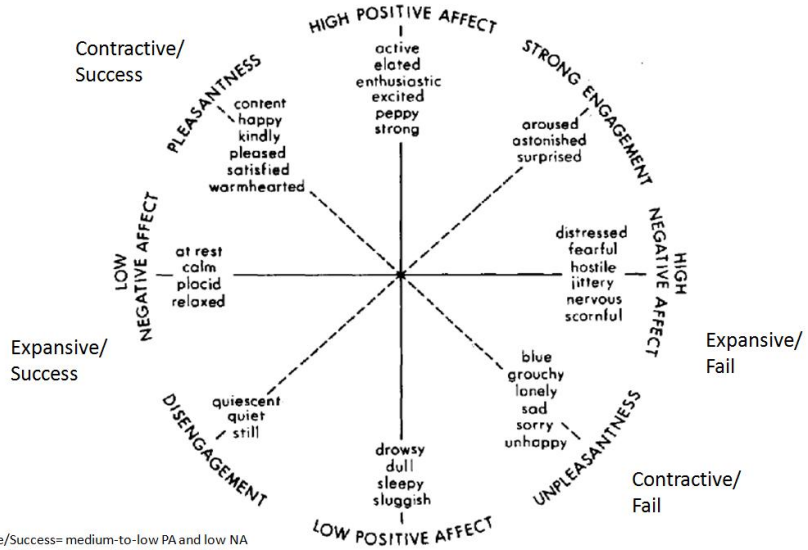


Figure 7- The two-factor structure of affect (Watson & Tellegen, 1985).

(Watson & Tellegen, 1985). This two-factor structure is characterized by the amount of Positive Affect and Negative Affect participants are feeling at the moment at a general level. This two-factor structure is based off of multiple studies in which two general factors or categories of affect emerged from many different affect descriptors as the best descriptors of the concepts captured by measures like the PANAS: Positive Affect and Negative Affect (Watson & Tellegen, 1985). The two-factor structure is shown above in Figure 7.

Placing the results from the different conditions of this embodiment study, for body posture induction before thought direction induction task conditions, the expansive/success condition would fall between the Low Negative Affect and Disengagement octants, the expansive/fail condition would fall between the High Negative Affect and Unpleasantness octants, the contractive/success condition would fall close to the Pleasantness octant and the contractive/fail condition would fall close to the Unpleasantness octant. See Figure 8 below.

Posture Induction before Thought Direction Induction



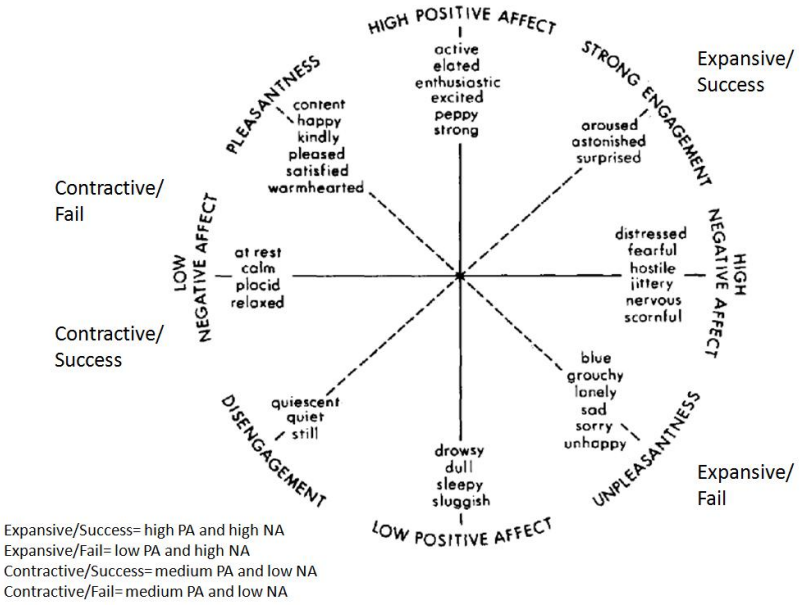
Expansive/Success= medium-to-low PA and low NA
Expansive/Fail= medium-to-high PA and high NA
Contractive/Success= high PA and low NA
Contractive/Fail= low PA and high NA

Figure 8- The two-factor structure of affect (Watson & Tellegen, 1985) with current study condition placement for all conditions that fall under the body posture induction before thought direction induction category.

The figure shows that those in the success conditions ended up in relatively more positive areas on the two-factor structure of affect than those in the failure conditions. This is to be expected if task salience were an important factor. The thought direction induction writing task was the last task in this section of conditions before the PANAS dependent measure.

Placing the results from the different conditions of this study for the thought direction induction before body posture induction conditions, by combining the positive affect and negative affect dimensions of each condition onto the two-factor structure, the expansive/success condition would fall close to the Strong Engagement octant, the expansive/fail condition would fall close to the Unpleasantness octant, the contractive/success condition would fall between the Low Negative Affect and Disengagement octants, and the contractive/fail condition would fall between the Low Negative Affect and Pleasantness octants. See Figure 9 for an illustration.

Thought Direction Induction before Posture Induction



Expansive/Success= high PA and high NA
Expansive/Fail= low PA and high NA
Contractive/Success= medium PA and low NA
Contractive/Fail= medium PA and low NA

Figure 9- The two-factor structure of affect (Watson & Tellegen, 1985) with current study condition placement for all conditions that fall under the thought direction induction before body posture induction category.

Those in the expansive body posture conditions were put into a different category of octants than those in the contractive conditions, in that those in the contractive conditions seem to be less aroused and feel more positive overall. This is deduced from their relative placements on the two-factor structure of affect. This difference is to be expected if participants were influenced by task salience and highlights the earlier data concerning what emotions the body positions elicited. While the postures overall may have been more uncomfortable, expansive positions in particular were more arousing and possibly more uncomfortable than the contractive positions, as well as more difficult to get into. This was reported particularly by those participants who did the body position induction after the thought direction induction. This piece of data is another clue to participants' negativity towards the postures.

Amount of Thought

Task salience is a present factor in this study and one that differentiates the two different possible orders of the tasks. However, past research conducted by Briñol and Petty indicates that there are likely two different processes by which thoughts may interact with embodiment tasks. When an embodiment task comes before established thoughts, there is evidence that an ease of processing may be what influences subsequent confidence. If induction timing is an important variable in this study, the results should illustrate a difference between those who did the body posture induction task first and those that did the thought direction induction writing task first, in terms of thinking and active processing. Factor 3 was used to measure amount of thought, due to the eigenvalues in the factor analysis between the measures "lost in thought" and "having mixed feelings (i.e. feeling both positive and negative at the same time)." Table 11 in Appendix B shows these results, using a univariate analysis of variance. The two fixed-factor univariate analysis of ANOVA (body posture induction before thought direction induction) is depicted in Table 11.2. This is illustrated in graph form in Figure 10.

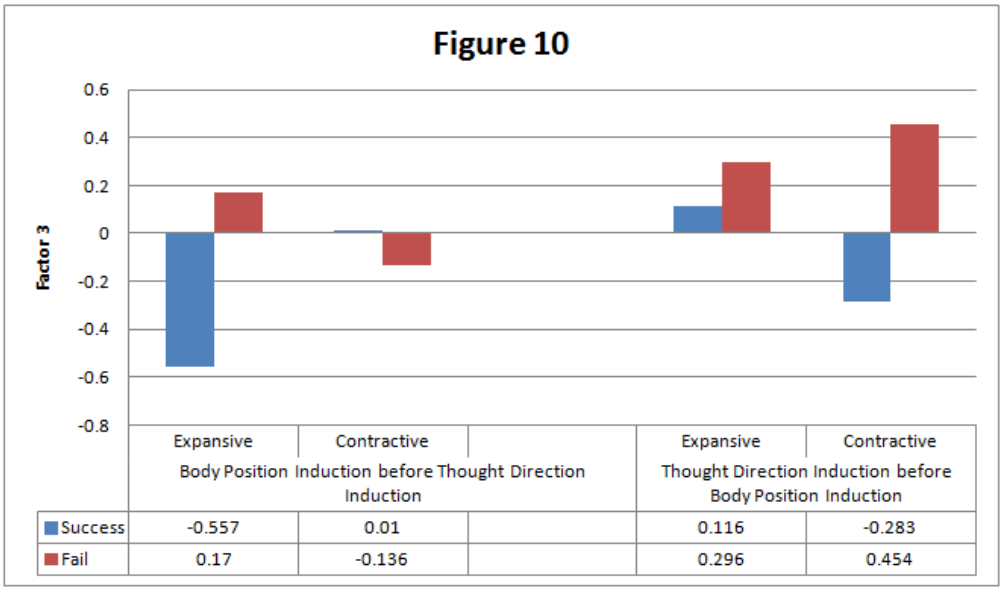


Figure 10- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Factor 3.

The figure shows that when the body posture induction came first, the expansive/success and the contractive/fail conditions scored lower on Factor 3 than did the contractive/success and the expansive/fail conditions ($F(1, 120)= 4.258$, $p<.05$). Scoring lower on Factor 3 means these conditions were less lost in thought and had less mixed feelings. The expansive/success condition and the contractive/fail condition both have a match between the valence of the positions and the valence of the thought direction writing task. When the thought direction induction came first and the body posture induction came second, the contractive/excel condition scored less on Factor 3 than any of the other conditions. The expansive/fail and contractive/fail conditions scored the highest, which means these conditions thought the most for this particular timing and had the most mixed feelings for this particular timing ($F(1, 120)= 4.258$, $p<.05$). These results show that there is a difference in amount of thought between the two induction timing conditions, and a matching effect for those conditions when the body posture induction came before the thought direction induction.

While the differences in the task order are important to ascertain, there should also be a hint that an interaction exists only when thoughts are established after an embodiment task in another potential measure of thought. Performing a two fixed factor univariate analysis of variance (ANOVA), for those in the body posture induction before thought direction induction conditions, on the variable “active” from the PANAS index indicated that the expansive/success and contractive/fail conditions reported to be feeling significantly less “active” than the expansive/fail and contractive/success conditions ($F(1, 60)= 4.229$, $p<.05$). Expansive/success and contractive/fail are once again the conditions in which there is a valence “match” between the postures and the writing task. See Table 12 in Appendix B and Figure 11 for this. There was

no significant interaction when the two fixed factor ANOVA was performed on the conditions in which the thought direction induction came first.

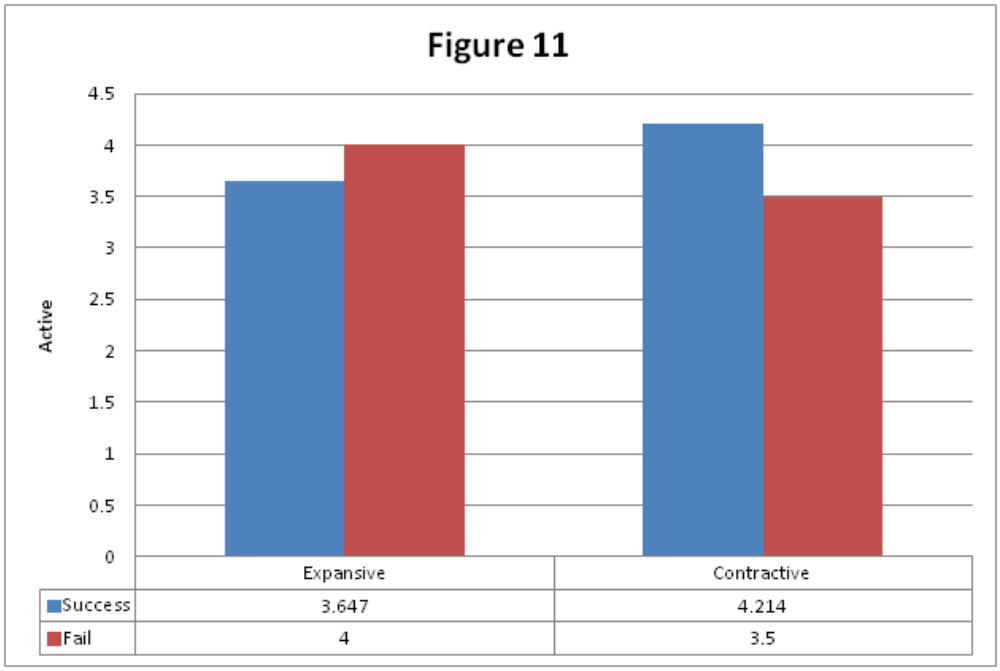


Figure 11- Graph depicting 2-way interaction (Posture Induction x Thought Direction Induction) for Active dependent affective measure from the PANAS.

Thought Direction Induction before Body Posture Induction Timing: Self-Validation

As previous research illustrates, there are two possible manifestations of embodiment tasks on confidence when messages or thoughts are involved. This study has thus far illustrated a difference in amount of thought and active processing that is important to one particular task order. However, it is still unsure whether self-validation occurred in the opposite task order, which would provide further evidence for a more complex embodiment model (Briñol & Petty, 2008; Briñol et al., 2011). When thoughts are established before an embodiment task, the embodiment task conveys different levels of thought confidence to the mind and this is expected to be evidenced in the self-attitudes measurements when the message is about the self. If self-validation were operating in this study, a specific interaction would be present in the conditions in which the thought direction induction came before body posture induction. There should be no

interaction or potentially a different type of interaction present for the conditions where the body posture induction came before the thought direction induction, in which self-validation should not be operating. The specific interaction of self-validation involves those in the expansive-excel and contractive-failure conditions scoring more positively on self-attitudes measures. This is the case in the results for two of the self-attitudes measures. The first of these self-attitudes measures is the extent to which participants agreed or disagreed with themselves (higher scores meaning they agreed with themselves more). Table 13 in Appendix B shows these results, using a univariate analysis of variance. The table illustrates the 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order). The results in graph form are below in Figure 12.

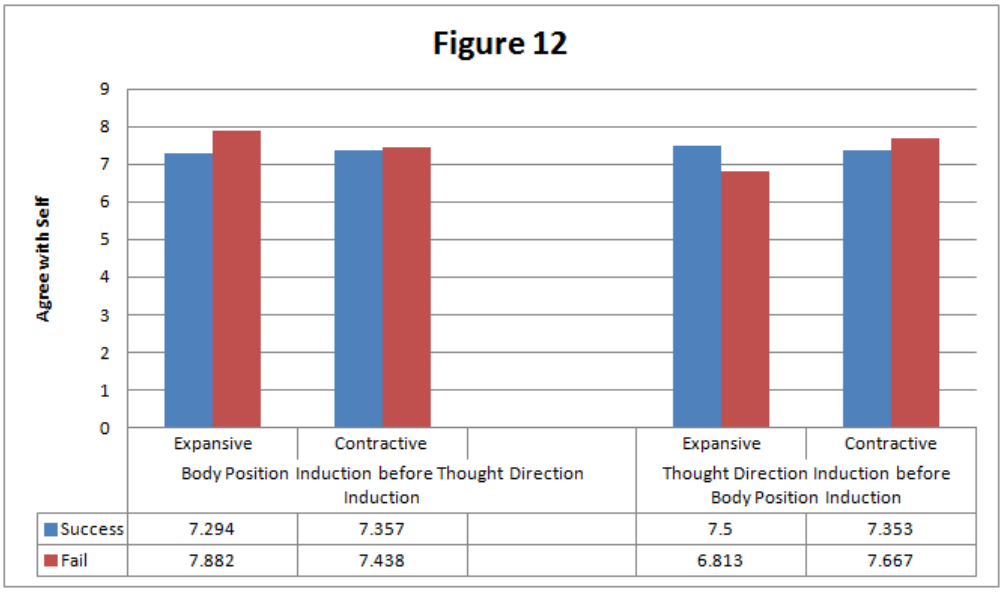


Figure 12- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Agree with Self dependent attitudes measures.

This figure illustrates that for the thought direction induction before body posture induction conditions, those that were in expansive postures and also wrote about excelling agreed with themselves more, and those that were in expansive postures and also wrote about failing agreed with themselves less ($F(1, 120)= 2.046$, $p=.155$). Conversely, those that were in contractive postures and wrote about excelling agreed with themselves less and those that were

in contractive postures and wrote about failing agreed with themselves more (F(1, 120)= 2.046, p=.155). In the conditions where the body posture induction came before the thought direction induction, there was no such interaction amongst the variables.

A similar pattern can be seen for the item "beneficial" versus "harmful" (with higher scores meaning that participants saw themselves as more beneficial than harmful). Table 14 in Appendix B shows these results, using a univariate analysis of variance (ANOVA).

This table illustrates the 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order). The results in graph form are below in Figure 13.

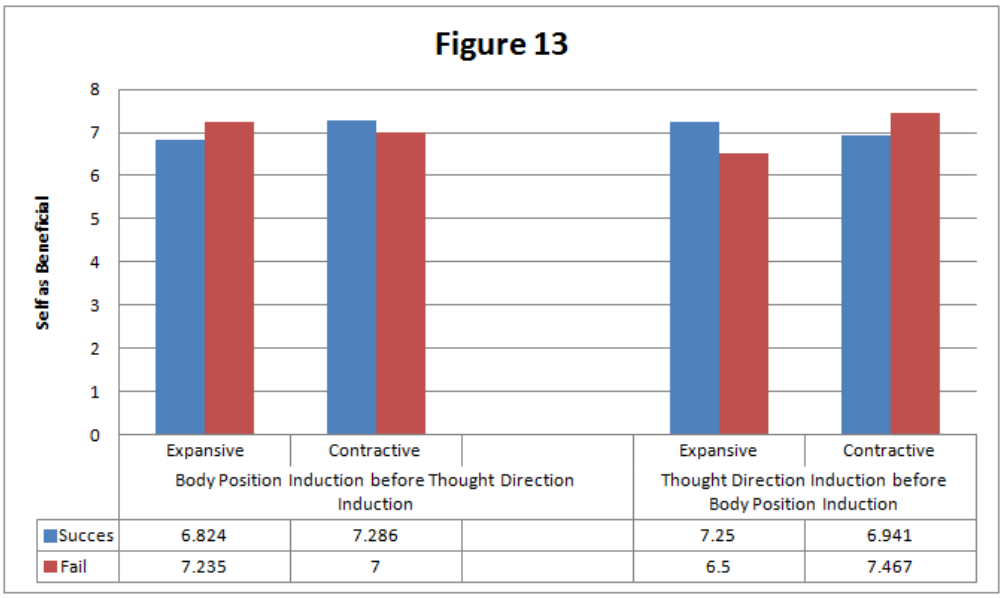


Figure 13- Graph depicting 3-way interaction (Posture Induction x Thought Direction Induction x Induction Order) for Self as Beneficial dependent attitude measure.

This figure illustrates that for the conditions in which the thought direction induction came before the body posture induction, those that were in expansive postures and also wrote about excelling saw themselves as more beneficial and those that were in expansive postures and wrote about failing saw themselves as less beneficial (F(1, 120)= 2.556, p=.113). Conversely, those that were in contractive postures and wrote about excelling saw themselves as less beneficial and those that were in contractive postures and wrote about failing saw themselves as more beneficial (F(1, 120)= 2.556, p=.113). This was also trending towards being significant

after calculating the two fixed factor univariate analysis of variance ($F(1, 60)= 2.145$, $p=.148$). See Table 15 in Appendix B. In the conditions where the body posture induction came before the thought direction induction, there was no such interaction amongst the variables.

Discussion

The results of this study are consistent with both current embodiment and self-validation theory. Two models were investigated in this study to determine which was more applicable to the underlying mechanisms of the embodiment process. The first, established by Carney, Cuddy & Yap (2010), used a study in which two postures seemed to directly relate to subsequent gains or losses in feelings of power to conjecture about embodiment. The postures were directly connected to the rated affect according to their work. However, another embodiment model, described by Briñol and Petty (2008, 2011), maintains that the process is more metacognitive, in that body postures are indirectly related to subsequent affect and attitudes due to people's thoughts about their thoughts. In this second model, there are two different ways to examine this process: one in which thoughts are established after an embodiment task, and one in which thoughts are established before an embodiment task. When thoughts are established after an embodiment task, the amount of subsequent processing should be a dependent variable, because effects of fluency and disfluency are created metacognitively (Briñol et al., 2011; Alter et al., 2007). When thoughts are established before an embodiment task, self-attitudes should be a dependent variable, because self-validation is likely to occur. Self-validation is a process which manipulates thought confidence to a large degree (Briñol & Petty, 2008; Petty & Barden, 2007; Briñol, et al., 2009). In this study, there were significant differences between the two different timings of the body posture and thought direction inductions.

This study found the hypothesized effects theorized by past embodiment research. When thoughts were established after an embodiment task (the writing task came after the body posture task), those participants in fluent conditions thought less. These participants (expansive positions who wrote about succeeding and contractive positions who wrote about failing) were significantly less lost in thought and reported having less mixed feelings (i.e. feeling both positive and negative at the same time). These conditions also reported feeling less "active," a dependent measure of the PANAS. Being in the expansive position paired with writing about failing, however, was a condition of disfluency, as well as being in a contractive condition and writing about past success. When thoughts were established after the body posture induction, these participants in disfluent conditions thought more: they were more lost in thought, had more mixed feelings, and felt more active.

When thoughts were established before the embodiment task (the writing task came before the body posture induction), participants in expansive conditions had more thought confidence than participants in doubtful, contractive positions. This is inferred through the dependent variables of "agree with self" and "beneficial." Those in the expansive/success condition and those in the contractive/failure condition should have higher scores on "agree with self" and "beneficial" according to self-validation, because those in the expansive/success condition should be trusting their positive thoughts, while those in the contractive/failure condition should be distrusting their negative thoughts and as a result, feel more positive and inclined to have positive self-attitudes. This is what the study found in relation to "agree with self" and "beneficial" dependent measures. Those in the expansive/failure condition and those in the contractive/success conditions should have lower scores on "agree with self" and "beneficial" according to the self-validation literature, when thoughts are established before an embodiment

task. This is because those in the expansive/failure condition should have confidence in their negative thoughts, while those in the contractive/success condition should have doubt about their positive thoughts. This is also what the study found: both of these conditions scored lower on the self-attitude measures than the expansive/success and contractive/failure conditions. These results offer support for the ease of processing and self-validation version of the embodiment model, because significantly different effects were found depending on when thoughts were established.

This study contributed to the field of embodiment and metacognition by manipulating specific inductions that are relevant to body postures and persuasive messages. Other studies, although few, have also manipulated task order to find different effects in both (see Briñol et al., 2007), but the current study was unique due to the body postures used for the embodiment task, as well as the nature of the thought induction task. This study was also distinctive in the particular interest of measuring the self-report of the subsequent amount of thought for each participant after the inductions. Other studies have measured levels of active processing through answering simple or complex questions (see Alter et al., 2007), but not through these specific self-report scales.

Lastly, one aspect of the results contributed a unique finding to the field which has not yet been discussed. The effect of task salience on subsequent affect and attitudes was a pertinent part of this study. When the writing task thought direction induction came after the body posture induction, the valence of the thought direction induction was directly tied to the results of the PANAS and the two-factor structure of affect. Those in the success-writing conditions ended up in more positive spots on the two-factor structure of affect than those in the failure conditions. Conversely, when the body posture induction was manipulated after the thought direction

induction, the valence of the body posture induction was directly tied to the results of the PANAS and the two-factor structure of affect, but not in the way that would have been anticipated. Those in the expansive postures felt more aroused and unpleasant than those in the contractive postures. This is a strong hint that these particular expansive postures were, at some level, fairly uncomfortable or unpleasant to spend time in. This effect of task salience has been previously researched (Higgins, 1996), but is new to this particular field. The salience of the task has important implications to this study. If participants found one position (the expansive) particularly uncomfortable, unpleasant or difficult to get into, as those who posed in the positions right before filling out the dependent measures felt, then the results quite possibly were affected in unanticipated ways, which is important to note. It could be argued that the reported effects may have been stronger if the expansive embodiment poses were more natural for participants to assume. In sum, this study especially contributed to knowledge about task salience and the effects of task salience on affect and attitudes, as well as broadening the scope of self-validation research to different body position inductions.

Despite the congruent results in many of the dependent measures to past research, there is still room for investigation, especially in the areas of self-reported confidence, happiness and the specific embodied positions. According to the literature in the field, ease or fluency and self-validation are both linked to confidence, as well as positive affect (Briñol et al., 2011). This study found significant effects on the extent of thinking and some measures of self-confidence, like “agree with self” and “beneficial.” However, significant effects on happiness or positive affect for those conditions made to feel more confident were not found. Since the specific postures used were one of the only drastically different elements in this study compared to past research, it is possible that the postures used were not ideal to embodiment. It is useful to note

here, again, that participants found the expansive positions particularly uncomfortable, possibly cancelling out effects that other embodied poses may have on happiness and positive affect. In sum, the field would greatly benefit from studies that continue to use Carney et al.'s (2010) poses out of their original context, as well as from studies that ask about confidence and happiness in different ways.

This study also did not manipulate another important area worth noting: the amount of thinking needed to create self-relevant messages about success or failure. Research indicates that usually, when thinking is not constrained to be high or low, the extent of thinking is affected (Briñol et al., 2011). This study did not manipulate the extent of thinking, so it could be assumed that thinking in this study was not constrained to be high or low, and therefore, this is why the study found significant differences in the extent of thinking. However, studies that involved participants recording their best and worst qualities have been considered in the past to be high-thinking situation studies (Briñol et al., 2007; Briñol et al., 2009). Writing good and bad qualities about the self does not seem to be far off from writing about past successes and failures of the self, which is what the current study employed. In high thinking study conditions, participants consider all that is in the context of the situation, which can include their body movement and postures. This is why past research has found a lot of support for the self-validation hypothesis in study conditions that force a high amount of thinking (Briñol et al., 2011). It is possible that this study elicited some high amounts of thinking in some participants, lending to the marginal self-validation results. However, it is very likely that generally, this study did not constrain the amount of thinking to be high or low. Future research should focus on how manipulation of the amount of thinking that should be elicited by the production of certain thoughts affects the interaction between embodiment and confidence.

We look to the body to determine what we feel and think; a process known as embodiment (Briñol & Petty, 2008). However, we also look to the body to determine how we feel about our thoughts; this is known as metacognition (Petty & Briñol, 2008, Petty et. al., 2002). Embodiment and metaconition are not only relevant to the current study, to past and future research, but also to people's daily lives. Understanding the benefits and consequences of the naturally expansive or contractive postures people often perform throughout the day may help people before job interviews, important presentations and public speeches, as long as mental self-talk is positive. Recent job interview claims by the authors of the expansive and contractive positions used in this study (Carney et al., 2010) about positioning the self into an expansive position when someone is having negative self-thoughts, so that they then feel more powerful before interviews, may not be best after this study pitted their positions against a more complicated embodiment model. Keeping self-validation in mind during conditions when thinking is high may be a better avenue in these situations. The results of this study supported the current embodiment and metacognition research and, therefore, can be beneficial in practical ways in the future.

References

Alter, A. L., Oppenheimer, D. M., Epley, N., & Norwick, R. N. (2007). Overcoming intuition: Metacognitive difficulty activates analytic reasoning. *Journal of Experiment Psychology: General, 136,* 569-576.

Bem, D. J. (1965). An experimental analysis of self-persuasion. *Journal of Experimental Social Psychology, 1,* 199-218.

Briñol, P., & Petty, R. E. (2003). Overt head movements and persuasion: A self validation analysis. *Journal of Personality and Social Psychology, 84,* 1123–1139.

Briñol, P., & Petty, R. E. (2008). Embodied persuasion: Fundamental processes by which bodily responses can impact attitudes. In G. R. Semin & E. R. Smith (Eds.), *Embodiment grounding: Social, cognitive, affective, and neuroscientific approaches* (pp. 184–207). Cambridge, England: Cambridge University Press.

Briñol, P., Petty, R. E., & Barden, J. (2007). Happiness versus sadness as determinant of thought confidence in persuasion: A self-validation analysis. *Journal of Personality and Social Psychology, 93,* 711-727.

Briñol, P., Petty, R. E., Gallardo, I., & DeMarree K. G. (2007). The effect of self-affirmation in nonthreatening persuasion domains: Timing affects the process. *Personality and Social Psychology Bulletin, 33,* 1533-1546.

Briñol, P., Petty, R. E., & Wagner, B. (2009). Body posture effects on self-evaluation: A self-validation approach. *European Journal of Social Psychology, 39,* 1053-1064.

Briñol, P., Petty, R. E., & Wagner, B. (2011). Embodied attitude change: A self-validation perspective. *Social and Personality Psychology Compass, 10,* 1-12.

Briñol, P., Petty, R. E., Valle, C., Rucker, D. D., & Becerra, A. (2007). The effects of message

recipients' power before and after persuasion: A self-validation analysis. *Journal of Personality and Social Psychology, 93,* 1040-1053.

Briñol, P., Tormala, Z. L., & Petty, R. E. (2011). Ease and persuasion: Multiple processes, meanings and effects. In C. Unkelbach & R. Greifeneder (Eds.), *The experience of thinking.* New York, New York: Psychology Press.

Cacioppo, J. T., Priester, J. R., & Berntson, G. G. (1993). Rudimentary determinants of attitudes. II: Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology, 65,* 5-17.

Carney, D.R., Cuddy, A.J., & Yap, A.J. (2010). Power posing: brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science, 21,* 1-6.

Darwin, C. (1965). *The expression of the emotions in man and animals.* Chicago: University of Chicago Press. (Original work published 1872).

Förster, J., & Strack, F. (1996). Influence of overt head movements on memory for valenced words: A case of conceptual-motor compatibility. *Journal of Personality and Social Psychology, 71,* 421-430.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability and salience. In E.T. Higgins & A.W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133-168). New York: Guilford Press.

Horcajo, J., Petty, R. E., Briñol, P. (2010). The effects of majority versus minority source status on persuasion: A self-validation analysis. *Journal of Personality and Social Psychology, 99,* 498-512.

James, William, (1884). What is an emotion? *Mind*, 9: 188–205.

Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion.

Cognition and Emotion, 17, 297-314.

Petty, R. E., & Briñol, P. (2008). Persuasion: From Single to Multiple to Metacognitive Processes. *Perspectives on Psychological Science, 3,* 137-147.

Petty, R. E., Briñol, P., & Tormala, Z. L. (2002). Thought confidence as a determinant of persuasion: The self-validation hypothesis. *Journal of Personality and Social Psychology, 82*, 722–741.

Petty, R. E., Briñol, P., Tormala, Z. L., & Wegener, D. T. (2007). The role of meta-cognition in social judgment. In E. T. Higgins & A. W. Kruglanski, (Eds.) *Social psychology: A handbook of basic principles* (2nd ed., pp. 254-284). New York: Guilford Press.

Petty, R.E., Wells, G.L., Heesacker, M., Brock, T. C., & Cacioppo, J. T. (1983). The effects of recipient posture on persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin, 9,* 209-222.

Song, H., & Schwarz, N. (2008). Fluency and the detection of misleading questions: Low processing fluency attenuates the Moses illusion. *Social Cognition, 26,* 791-799.

Tom, G., Pettersen, P., Lau, T., Burton, T., & Cook, J. (1991). The role of overt head movement in the formation of affect. *Basic and Applied Social Psychology*, *12*, 281–289.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology, 54,* 1063-1070.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98,* 219-235.

Wells, G. L., & Petty, R.E. (1980). The effects of overt head movements on persuasion:

Compatibility and incompatibility of responses. *Basic and Applied Social Psychology*, *1*, 219-230.

Wichman, A.L., Briñol, P., Petty, R. E., Rucker, D. D., Tormala, Z. L. & Weary, G. (2009). Doubting one's doubt: A formula for confidence? *Journal of Experimental Social Psychology, 46*, 350-355.

Appendix A

Materials

Consent Form

The Ohio State University Consent to Participate in Research

Study Title:	Personality Effects on Different Types of Tasks
Researcher:	**Dr. William Cunningham**
Sponsor:	**N/A**

This is a consent form for research participation. It contains important information about this study and what to expect if you decide to participate.

Your participation is voluntary.

Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate. If you decide to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose: ***The purpose of the study is to learn more about how different personality characteristics are related to different tasks.***

Procedures/Tasks:

In this study you will:

- Complete the consent forms and ensure you fully understand the study procedure.
- Physically position yourself as instructed by the researcher for one minute.
- Assume a second position as instructed.
- Write about yourself and tasks you do.
- Answer some questions about yourself and your personality.

Duration: The entire study will take about 30 minutes.

You may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.

Risks and Benefits: There are no known risks. There are no direct benefits to you from participation in this study, but by participating in the research process as a participant, you are benefitting society at large by helping researchers discover new information.

Confidentiality:

Efforts will be made to keep your study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your participation in this study may be disclosed if required by state law. Also, your records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-regulated research) supporting the study.

Incentives: No payment will be issued for taking part in this study; however, by signing up, you have received credit for the REP portion of your Psychology 100 class and the incentive to benefit society at large by helping researchers discover new information

Participant Rights:

You may refuse to participate in this study without penalty or loss of benefits to which you are otherwise entitled. If you are a student or employee at Ohio State, your decision will not affect your grades or employment status.

If you choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give up any personal legal rights you may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:
For questions, concerns, or complaints about the study you may contact William Cunningham, Ph.D., at (614) 247-6139 or cunningham.417@osu.edu.

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If you are harmed as a result of participating in this study or for questions about a study-related harm, you may contact William Cunningham, Ph.D., at (614) 247-6139 or cunningham.417@osu.edu.

Signing the consent form

I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to participate in this study.

I am not giving up any legal rights by signing this form. I will be given a copy of this form.

Printed name of subject	**Signature of subject**
	AM/PM
	Date and time
Printed name of person authorized to consent for subject (when applicable)	**Signature of person authorized to consent for subject (when applicable)**
	AM/PM
Relationship to the subject	**Date and time**

Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Printed name of person obtaining consent	**Signature of person obtaining consent**
	AM/PM
	Date and time

Appendix B

Tables

Table 1

Manipulation Checks

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PositionDifficulty	128	1	9	2.30	1.910
PositionPositivity	128	1	9	4.66	1.879
PositionConfidence	128	1	9	5.51	2.407
Valid N (listwise)	128				

Table 2

Position Difficulty Manipulation Check- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: PositionDifficulty

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	33.897[a]	7	4.842	1.354	.231
Intercept	677.404	1	677.404	189.386	.000
SuccessFail	2.339	1	2.339	.654	.420
BodyWriteOrder	3.163	1	3.163	.884	.349
ExpansiveContractive	6.406	1	6.406	1.791	.183
SuccessFail * BodyWriteOrder	.722	1	.722	.202	.654
SuccessFail * ExpansiveContractive	8.360	1	8.360	2.337	.129
BodyWriteOrder * ExpansiveContractive	12.494	1	12.494	3.493	.064
SuccessFail * BodyWriteOrder * ExpansiveContractive	.002	1	.002	.001	.982
Error	429.221	120	3.577		
Total	1143.000	128			
Corrected Total	463.117	127			

a. R Squared = .073 (Adjusted R Squared = .019)

Table 3

Position Difficulty Manipulation Check- 2 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: PositionDifficulty

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.364[a]	3	7.455	2.094	.110
Intercept	387.408	1	387.408	108.836	.000
SuccessFail	.231	1	.231	.065	.800
ExpansiveContractive	18.437	1	18.437	5.180	.026
SuccessFail * ExpansiveContractive	4.067	1	4.067	1.143	.289
Error	213.573	60	3.560		
Total	626.000	64			
Corrected Total	235.938	63			

a. R Squared = .095 (Adjusted R Squared = .050)

Table 4

Position Positivity Manipulation Check- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: PositionPositivity

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25.659[a]	7	3.666	1.040	.407
Intercept	2761.047	1	2761.047	783.468	.000
SuccessFail	.108	1	.108	.031	.861
BodyWriteOrder	.006	1	.006	.002	.966
ExpansiveContractive	.017	1	.017	.005	.945
SuccessFail * BodyWriteOrder	12.334	1	12.334	3.500	.064
SuccessFail * ExpansiveContractive	2.993	1	2.993	.849	.359
BodyWriteOrder * ExpansiveContractive	4.808	1	4.808	1.364	.245
SuccessFail * BodyWriteOrder * ExpansiveContractive	5.969	1	5.969	1.694	.196
Error	422.896	120	3.524		
Total	3233.000	128			
Corrected Total	448.555	127			

a. R Squared = .057 (Adjusted R Squared = .002)

Table 5

Position Confidence-Inducing Manipulation Check- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: PositionConfidence

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	36.164[a]	7	5.166	.886	.520
Intercept	3853.000	1	3853.000	660.677	.000
SuccessFail	.796	1	.796	.136	.713
BodyWriteOrder	7.560	1	7.560	1.296	.257
ExpansiveContractive	8.709	1	8.709	1.493	.224
SuccessFail * BodyWriteOrder	3.465	1	3.465	.594	.442
SuccessFail * ExpansiveContractive	.656	1	.656	.112	.738
BodyWriteOrder * ExpansiveContractive	11.232	1	11.232	1.926	.168
SuccessFail * BodyWriteOrder * ExpansiveContractive	4.631	1	4.631	.794	.375
Error	699.828	120	5.832		
Total	4619.000	128			
Corrected Total	735.992	127			

a. R Squared = .049 (Adjusted R Squared = -.006)

Tables 6.1 and 6.2

Factor Analysis

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.438	34.377	34.377	1.806	18.058	18.058	2.543
2	1.868	18.682	53.059	2.363	23.634	41.692	2.136
3	1.063	10.634	63.693	.890	8.897	50.589	1.766
4	.721	7.209	70.902				
5	.700	6.999	77.900				
6	.577	5.772	83.673				
7	.533	5.330	89.003				
8	.504	5.042	94.046				
9	.343	3.426	97.471				
10	.253	2.529	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Structure Matrix

	Factor		
	1	2	3
scale1	.827	-.421	-.300
scale2	.708	-.354	.046
scale3	.643	-.393	-.277
scale4	-.184	.677	.319
scale5	-.509	.551	.254
scale6	-.296	.741	.416
scale7	.383	.200	.091
scale8	-.150	.316	.488
scale9	-.207	.461	.999
scale10	.593	-.128	-.117

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

Table 7

PANAS Means

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Sum PA	128	16	50	34.91	7.119
Sum NA	128	10	37	19.10	6.555
Valid N (listwise)	128				

Table 8

Factor 1- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Factor 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.603[a]	7	1.515	1.894	.076
Intercept	.012	1	.012	.015	.904
SuccessFail	.023	1	.023	.029	.865
BodyWriteOrder	7.428	1	7.428	9.289	.003
ExpansiveContractive	.786	1	.786	.983	.324
SuccessFail * BodyWriteOrder	.885	1	.885	1.106	.295
SuccessFail * ExpansiveContractive	.643	1	.643	.804	.372
BodyWriteOrder * ExpansiveContractive	.379	1	.379	.473	.493
SuccessFail * BodyWriteOrder * ExpansiveContractive	1.016	1	1.016	1.271	.262
Error	95.959	120	.800		
Total	106.563	128			
Corrected Total	106.563	127			

a. R Squared = .100 (Adjusted R Squared = .047)

Table 9

PANAS PA- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Sum PA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	610.840[a]	7	87.263	1.798	.094
Intercept	155838.018	1	155838.018	3210.279	.000
SuccessFail	73.689	1	73.689	1.518	.220
BodyWrite	300.766	1	300.766	6.196	.014
ExpansiveContractive	.009	1	.009	.000	.989
SuccessFail * BodyWrite	1.692	1	1.692	.035	.852
SuccessFail * ExpansiveContractive	.378	1	.378	.008	.930
BodyWrite * ExpansiveContractive	.819	1	.819	.017	.897
SuccessFail * BodyWrite * ExpansiveContractive	253.189	1	253.189	5.216	.024
Error	5825.215	120	48.543		
Total	162467.000	128			
Corrected Total	6436.055	127			

a. R Squared = .095 (Adjusted R Squared = .042)

Table 10

PANAS NA- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Sum NA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	247.075[a]	7	35.296	.813	.578
Intercept	46413.520	1	46413.520	1068.901	.000
SuccessFail	43.612	1	43.612	1.004	.318
BodyWriteOrder	27.614	1	27.614	.636	.427
ExpansiveContractive	114.983	1	114.983	2.648	.106
SuccessFail * BodyWriteOrder	17.000	1	17.000	.392	.533
SuccessFail * ExpansiveContractive	3.903	1	3.903	.090	.765
BodyWriteOrder * ExpansiveContractive	40.811	1	40.811	.940	.334
SuccessFail * BodyWriteOrder * ExpansiveContractive	1.466	1	1.466	.034	.855
Error	5210.605	120	43.422		
Total	52161.000	128			
Corrected Total	5457.680	127			

a. R Squared = .045 (Adjusted R Squared = -.010)

Table 11

Factor 3- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Factor 3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.137[a]	7	1.734	1.814	.091
Intercept	.010	1	.010	.011	.918
SuccessFail	4.472	1	4.472	4.678	.033
BodyWriteOrder	2.397	1	2.397	2.507	.116
ExpansiveContractive	.001	1	.001	.001	.978
SuccessFail * BodyWriteOrder	.224	1	.224	.235	.629
SuccessFail * ExpansiveContractive	.199	1	.199	.208	.649
BodyWriteOrder * ExpansiveContractive	.500	1	.500	.523	.471
SuccessFail * BodyWriteOrder * ExpansiveContractive	4.071	1	4.071	4.258	.041
Error	114.723	120	.956		
Total	126.859	128			
Corrected Total	126.859	127			

a. R Squared = .096 (Adjusted R Squared = .043)

Table 11.2

Factor 3- 2 Fixed Factors, Body Posture Induction before Thought Direction Induction

Tests of Between-Subjects Effects

Dependent Variable: Factor 3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.903[a]	3	1.634	2.094	.110
Intercept	1.045	1	1.045	1.339	.252
SuccessFail	1.344	1	1.344	1.722	.194
ExpansiveContractive	.269	1	.269	.344	.559
SuccessFail * ExpansiveContractive	3.029	1	3.029	3.881	.053
Error	46.828	60	.780		
Total	52.889	64			
Corrected Total	51.731	63			

a. R Squared = .095 (Adjusted R Squared = .050)

Table 12

"Active" from PANAS- 2 Fixed Factors, Body Posture Induction before Thought Direction Induction

Tests of Between-Subjects Effects

Dependent Variable: ActivePANAS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.870[a]	3	1.623	1.516	.220
Intercept	937.972	1	937.972	876.070	.000
SuccessFail	.519	1	.519	.485	.489
ExpansiveContractive	.018	1	.018	.017	.897
SuccessFail * ExpansiveContractive	4.527	1	4.527	4.229	.044
Error	64.239	60	1.071		
Total	1007.000	64			
Corrected Total	69.109	63			

a. R Squared = .070 (Adjusted R Squared = .024)

Table 13

Agree/Disagree with Self- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Agree with Self

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.956[a]	7	1.565	.706	.667
Intercept	7004.803	1	7004.803	3158.885	.000
SuccessFail	.173	1	.173	.078	.780
BodyWriteOrder	.813	1	.813	.367	.546
ExpansiveContractive	.211	1	.211	.095	.758
SuccessFail * BodyWriteOrder	2.164	1	2.164	.976	.325
SuccessFail * ExpansiveContractive	.485	1	.485	.219	.641
BodyWriteOrder * ExpansiveContractive	2.362	1	2.362	1.065	.304
SuccessFail * BodyWriteOrder * ExpansiveContractive	4.536	1	4.536	2.046	.155
Error	266.099	120	2.217		
Total	7313.000	128			
Corrected Total	277.055	127			

a. R Squared = .040 (Adjusted R Squared = -.016)

Table 14

Beneficial/Harmful- 3 Fixed Factors

Tests of Between-Subjects Effects

Dependent Variable: Beneficial/Harmful

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.556[a]	7	1.508	.497	.835
Intercept	6358.766	1	6358.766	2095.945	.000
SuccessFail	.019	1	.019	.006	.937
BodyWriteOrder	.069	1	.069	.023	.880
ExpansiveContractive	1.559	1	1.559	.514	.475
SuccessFail * BodyWriteOrder	.245	1	.245	.081	.777
SuccessFail * ExpansiveContractive	.665	1	.665	.219	.640
BodyWriteOrder * ExpansiveContractive	.370	1	.370	.122	.728
SuccessFail * BodyWriteOrder * ExpansiveContractive	7.753	1	7.753	2.556	.113
Error	364.061	120	3.034		
Total	6745.000	128			
Corrected Total	374.617	127			

a. R Squared = .028 (Adjusted R Squared = -.029)

Table 15

Beneficial/Harmful- 2 Fixed Factors- Thought Direction Induction before Body Posture Induction

Tests of Between-Subjects Effects

Dependent Variable: Beneficial/Harmful

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.263[a]	3	2.754	.910	.442
Intercept	3165.250	1	3165.250	1045.359	.000
ExpansiveContractive	1.728	1	1.728	.571	.453
SuccessFail	.201	1	.201	.066	.797
ExpansiveContractive * SuccessFail	6.495	1	6.495	2.145	.148
Error	181.675	60	3.028		
Total	3354.000	64			
Corrected Total	189.938	63			

a. R Squared = .044 (Adjusted R Squared = -.004)